

PCT

WORLD INTELLECTUAL PROPERTY ORGANIZATION
International Bureau



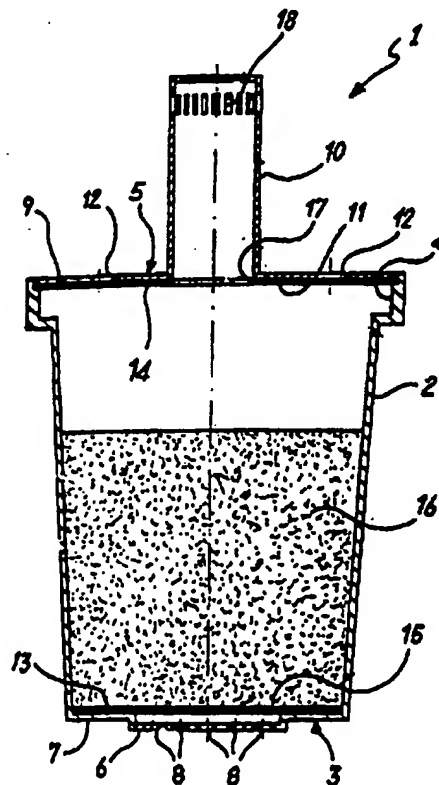
INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

<p>(51) International Patent Classification ⁶ : C02F 1/28, 1/42, C01J 47/00</p>	<p>A1</p>	<p>(11) International Publication Number: WO 96/21621 (43) International Publication Date: 18 July 1996 (18.07.96)</p>
<p>(21) International Application Number: PCT/EP96/00089 (22) International Filing Date: 10 January 1996 (10.01.96) (30) Priority Data: VI95A000007 13 January 1995 (13.01.95) IT (71) Applicant (for all designated States except US): L.A.I.C.A. LAVORAZIONE ITALIANA CASALINGHI S.N.C. DI ZAMBERLAN TERESA & C. [IT/IT]; Viale del Lavoro, 10, I-36020 Barbarano Vicentino (IT). (72) Inventor; and (75) Inventor/Applicant (for US only): MORETTO, Leonida [IT/IT]; Via Tormeno, 235/c, I-36100 Vicenza (IT). (74) Agent: CANTALUPPI, Stefano; Jacobacci & Perani S.p.A., Via Berchet, 9, I-35131 Padova (IT).</p>		<p>(81) Designated States: AL, AM, AT, AU, AZ, BB, BG, BR, BY, CA, CH, CN, CZ, DE, DK, EE, ES, FI, GB, GE, HU, IS, JP, KE, KG, KP, KR, KZ, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, TJ, TM, TR, TT, UA, UG, US, UZ, VN, ARIPO patent (KE, LS, MW, SD, SZ, UG), Eurasian patent (AZ, BY, KZ, RU, TJ, TM), European patent (AT, BE, CH, DE, DK, ES, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG).</p> <p>Published With international search report. Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.</p>

(54) Title: IMPROVED FILTER CARTRIDGE

(57) Abstract

The filter cartridge described is for use in devices for filtering liquids, particularly potable water, and comprises a container (2) closed by a lid (5), and a filtering barrier (14) placed against an essentially flat surface (11) of the lid (5) which faces into the container (2).



FOR THE PURPOSES OF INFORMATION ONLY

Codes used to identify States party to the PCT on the front pages of pamphlets publishing international applications under the PCT.

AM	Armenia	GB	United Kingdom	MW	Malawi
AT	Austria	GE	Georgia	MX	Mexico
AU	Australia	GN	Guinea	NE	Niger
BB	Barbados	GR	Greece	NL	Netherlands
BE	Belgium	HU	Hungary	NO	Norway
BF	Burkina Faso	IE	Ireland	NZ	New Zealand
BG	Bulgaria	IT	Italy	PL	Poland
BJ	Benin	JP	Japan	PT	Portugal
BR	Brazil	KE	Kenya	RO	Romania
BY	Belarus	KG	Kyrgyzstan	RU	Russian Federation
CA	Canada	KP	Democratic People's Republic of Korea	SD	Sudan
CF	Central African Republic	KR	Republic of Korea	SE	Sweden
CG	Congo	KZ	Kazakhstan	SG	Singapore
CH	Switzerland	LI	Liechtenstein	SI	Slovenia
CI	Côte d'Ivoire	LK	Sri Lanka	SK	Slovakia
CM	Cameroon	LR	Liberia	SN	Senegal
CN	China	LT	Lithuania	SZ	Swaziland
CS	Czechoslovakia	LU	Luxembourg	TD	Chad
CZ	Czech Republic	LV	Latvia	TG	Togo
DE	Germany	MC	Monaco	TJ	Tajikistan
DK	Denmark	MD	Republic of Moldova	TT	Trinidad and Tobago
EE	Estonia	MG	Madagascar	UA	Ukraine
ES	Spain	ML	Mali	UG	Uganda
FI	Finland	MN	Mongolia	US	United States of America
FR	France	MR	Mauritania	UZ	Uzbekistan
GA	Gabon			VN	Viet Nam

"Improved filter cartridge"**Technical Field**

5 The object of the invention is to provide an improved filter cartridge for purifying potable water.

Background art

10 Currently, there are many types of potable-water filter cartridges on the market, for fitting in suitable containers which generally hold a litre of water and into which water is introduced into an upper compartment in order then to pass into a lower compartment through a filter cartridge which has a limited lifetime and which, moreover, can filter a quantity of water not exceeding a certain
15 predetermined limit.

A suitable counting device enables the number of litres of water filtered by the cartridge, as well as the number of days which have passed from the date on which the cartridge was fitted in the container, to be
20 calculated in order to be able to assess when the cartridge should be replaced.

An example of a filter cartridge is known, for example, from US 5,049,272. This prior patent describes a cartridge having a removable frusto-conical lid against which a fibrous filtering barrier
25 is placed. The barrier is necessarily produced in the form of more or less loose fibres like felt in order to be able to adopt the frusto-conical configuration of the surface of the lid. This involves the need, in the first place, to adapt the barrier to the lid,
30 causing it to adopt the shape with consequent additional work and, in the second place, imposes limits on the selection of the materials usable to

form the filtering barrier, which have to be deformed in an extensible manner in order to adopt the frusto-conical shape starting from an original disc-shape. In the absence of suitable shape adaptation, the
5 barrier could move away from the surface of the lid locally with a consequent deterioration in its filtering capacity.

The object of the present invention is effectively to overcome these problems.

10 Disclosure of the Invention

This object is achieved by a filter cartridge formed according to the appended claims.

Brief Description of Drawings

The characteristics and advantages of the
15 invention will become clearer from the following detailed description of a preferred but not exclusive embodiment thereof illustrated by way of non-limiting example with reference to the appended drawings, in which:

20 Figure 1 (Sheet I) shows, in vertical axial section, a filter cartridge formed according to the invention,

Figure 2 is a plan view of a detail of the cartridge of Figure 1,

25 Figure 3 is a plan view of the filter cartridge of Figure 1,

Figure 4 shows a first variant relating to the upper portion of the pipe for the expulsion of air from the filter cartridge,

30 Figure 5 shows a second possible embodiment of the same, upper end of the pipe,

Figure 6 (Sheet II) shows a possible variant of the upper portion of the filter cartridge formed

according to the invention,

Figure 7 shows a further variant of the filter cartridge of the invention, also in vertical section.

Best Mode of Carrying out the Invention

5 In Figures 1 to 3, a filter cartridge according to the present invention is generally indicated 1. The cartridge 1 comprises a cup-shaped container 2 having a base 3 and an opposed opening 4 closed by a lid 5. The base 3 has, in slightly offset planes, a central
10 portion 6, surrounded by an annular portion 7. A plurality of holes 8 is formed in the central portion 6 for the outlet of the filtered water.

The lid 5 is essentially disc-shaped with a ring 9 in the centre of which is a pipe 10 for the outlet
15 of the air contained in the cartridge 1. The ring 9 is flat and, in particular, its surface 11, which is referred to as the first surface and is in a position facing the interior of the container 2, is flat. A plurality of through holes 12 open in the ring 9 in
20 order to admit the water to be filtered to the cartridge 1.

Respective, substantially flat, first and second filtering barriers 14, 15 are placed against the first surface 11 of the lid 5 and against the corresponding
25 surface 13 of the base 3 facing into the container 2. Given that the ring 9 is flat and the base 3 is substantially flat (except for the small central recess) the filtering barriers 14, 15 can be formed with flexible but not necessarily extensible
30 materials. For example, it has been possible to form one or both barriers with a membrane of microporous paper - of the type used to make teabags - which would not be able to adapt to conical surfaces without risk

of tearing.

Between the barriers 14, 15, inside the container 2, there is a granular filtering product 16 of known type.

5 The lid 5 is preferably welded onto the opening 4 of the container 2 with the membrane constituting the barrier 14 remaining held and pinched perimetally between the rim of the lid and a corresponding recess of the opening. The membrane or barrier 14 has a
10 central hole 17 for the free outlet of air towards the pipe 10. The pipe 10 is closed at the opposite end to the lid 5 and bears a plurality of narrow slots 18, near this opposite end. The slots 18 are advantageously narrow because they are intended
15 exclusively for discharging air from the container as a result of the entry of water through the holes 12. With this narrow width there is no fear of the filtering product 16 escaping from the container.

20 Figures 4 and 5 show two possible variants of the head end of the pipe 10, in the first of which slots 18a are arranged in the upper conical portion 19 of the pipe, whereas in the embodiment shown in Figure 5, the pipe 10 terminates at the top in a flat wall in which air-outlet holes 18b are formed.

25 Figure 6 shows a variant of the filter cartridge of the invention, obviously showing only the upper portion in which the upper air-outlet pipe is formed in two parts, a first, larger-diameter part 20 having water-outlet slots 21 which have a function similar to
30 that of the holes 12 of Figure 1, and an upper central part 22 having air-outlet slots 23 of smaller dimensions than the slots 21.

In the embodiment of the cartridge shown

5

partially in Figure 7, the centre of the lid 5 of the cartridge 1 has a first vertical pipe 24 terminating in a second smaller-diameter pipe 25 below which there is a further filtering barrier 26 which prevents the filtering product 16 from reaching the air-outlet pipe 25.

The upper portion of the pipe 25 of course has slots 27 for the outlet of the air from the container.

Naturally, further possible variations of the particular shape of the cartridge of the invention may relate to the air-outlet areas which may also have shapes other than a circular shape and, in any case, may not be arranged centrally, these possible variations also being considered to fall within the scope of the present invention.

20

25

30

CLAIMS

1. A filter cartridge for use in a device for filtering liquids, particularly potable water, including a container (2) having opposed ends closed, respectively, by a lid (5) and by a base (3) both having holes (6, 4) for the outlet of water, a filtering product (16) disposed in the container (2) between the lid (5) and the base (3), a first filtering barrier (14) between a first surface (11) of the lid which faces into the container and the filtering product (16) and a second filtering barrier (15) between the filtering product and a surface (13) of the base which faces into the container, and a pipe (10) for the outlet of air from the container, opening in the lid (5) and extending away from the base (3), characterized in that the first surface (11) of the lid (5) is substantially flat, at least in the region of the water-outlet holes (6).
2. A filter cartridge according to Claim 1, in which the first filtering barrier (14) is essentially flat.
3. A filter cartridge according to Claim 1 or Claim 2, in which the air-outlet pipe (10) opens centrally in the lid (5).
4. A filter cartridge according to Claim 1, in which the lid (5) is welded onto the container (2).
5. A filter cartridge according to one or more of the preceding claims in which the first filtering barrier (14) is a membrane held between a perimetral edge of the lid and a corresponding rim of the container.
6. A filter cartridge according to Claim 5, in which the membrane is formed of microporous paper.

7. A filter cartridge according to Claim 5 or Claim 6, in which the membrane is formed of inextensible material.

5 8. A filter cartridge according to one or more of the preceding claims, in which a plurality of slots (18) for the outlet of the air from the container (2) is formed at the opposite end of the pipe (10) to the lid (5).

10 9. A filter cartridge according to Claim 1, in which the pipe (10) is formed in two parts (20, 22), the first part (20) having slots (21) for the outlet of the water entering the container (2) through the holes (12), and the second part (22), which has a smaller diameter than the first part, having slots (23) for the release of air from the container.

15 10. A filter cartridge according to Claim 1, in which the opposite end of the pipe (10) to the lid (5) has slots (27) for the outlet of the air from the container (2), a further filtering barrier (26) being
20 disposed between the slots (27) and the container (2) to prevent the escape of the filtering product (16) from the container.

25

30

1 / 2

FIG. 1

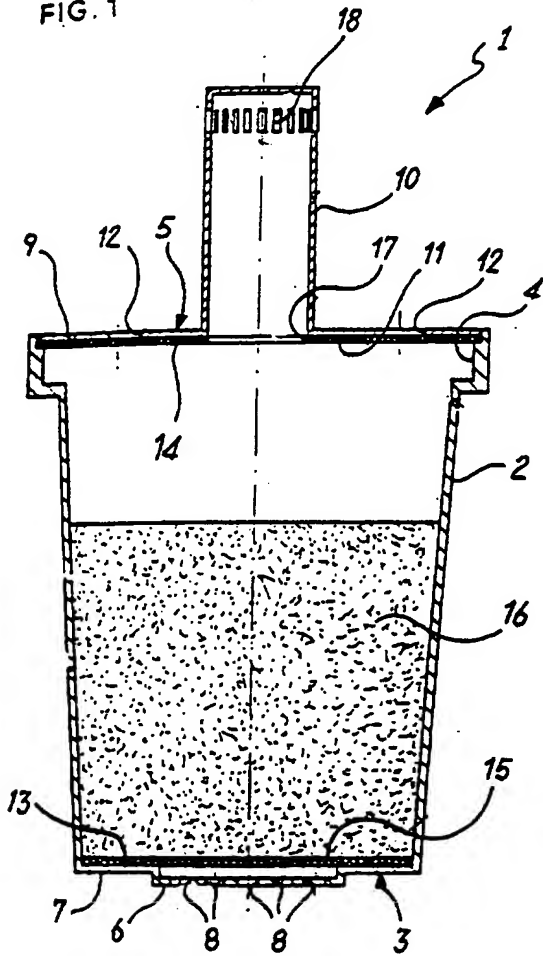


FIG. 4

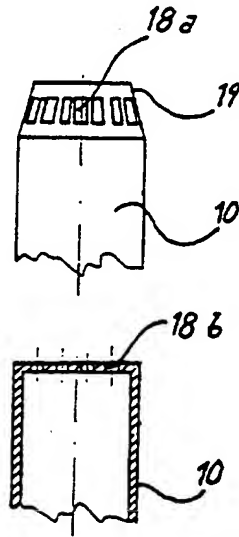


FIG. 5

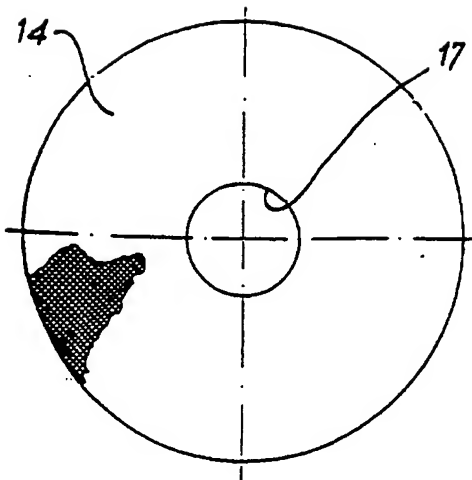


FIG. 2

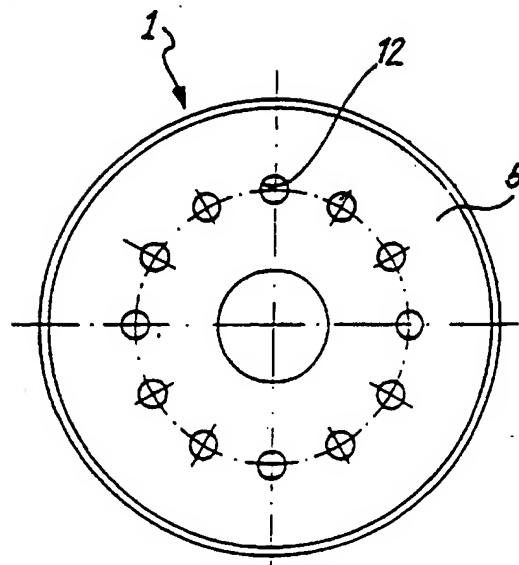


FIG. 3

2 / 2

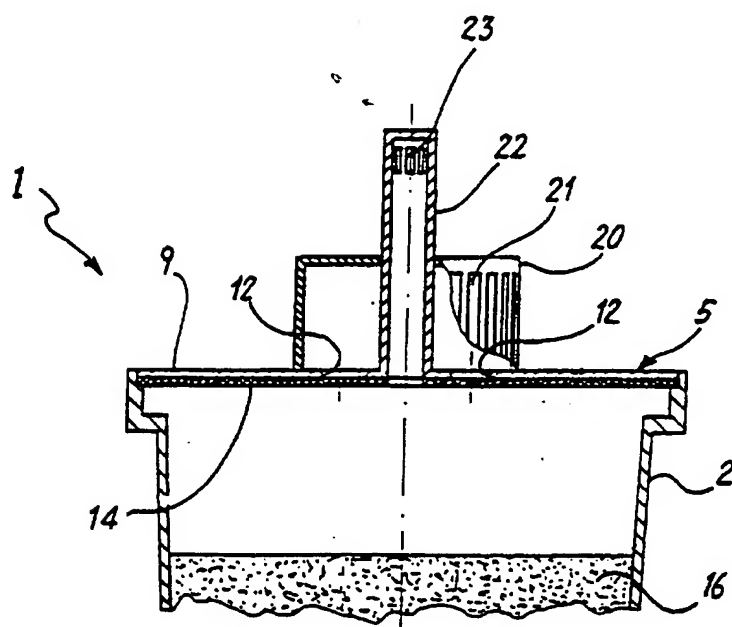


FIG. 6

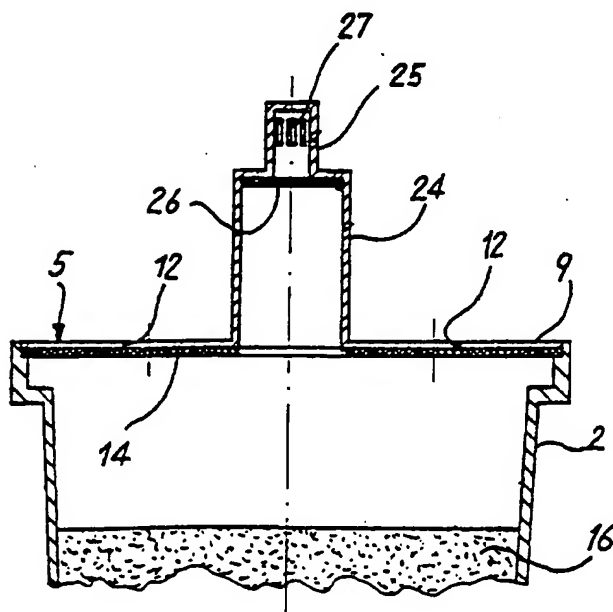


FIG. 7

INTERNATIONAL SEARCH REPORT

International Application No

PCT/EP 96/00089

A. CLASSIFICATION OF SUBJECT MATTER
IPC 6 C02F1/28 C02F1/42 B01J47/00

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 6 C02F B01J

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US,A,5 049 272 (NIEWEG HEINRICH) 17 September 1991 see column 2, line 35 - column 4, line 3; figure 2 ---	1-10
A	EP,A,0 613 861 (BRITA WASSERFILTER) 7 September 1994 ---	
A	EP,A,0 542 122 (LEIFHEIT AG) 19 May 1993 ---	
A	EP,A,0 340 382 (BRITA WASSERFILTER) 8 November 1989 -----	

☐ Further documents are listed in the continuation of box C.☒ Patent family members are listed in annex.

* Special categories of cited documents:

- *A* document defining the general state of the art which is not considered to be of particular relevance
- *E* earlier document but published on or after the international filing date
- *L* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- *O* document referring to an oral disclosure, use, exhibition or other means
- *P* document published prior to the international filing date but later than the priority date claimed

- *T* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
- *X* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
- *Y* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.
- *A* document member of the same patent family

Date of the actual completion of the international search

23 May 1996

Date of mailing of the international search report

12-06-1996

Name and mailing address of the ISA

European Patent Office, P.B. 5818 Patentlaan 2
NL - 2280 HV Rijswijk
Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,
Fax: (+31-70) 340-3016

Authorized officer

Assogna, R

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/EP 96/00089

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US-A-5049272	17-09-91	DE-U- 8813571 AT-T- 110042 CA-A- 2001500 DE-D- 58908211 EP-A- 0365887	11-05-89 15-09-94 28-04-90 22-09-94 02-05-90
EP-A-0613861	07-09-94	DE-A- 4304536 PL-A- 302071 PT-A- 101457	18-08-94 22-08-94 31-10-94
EP-A-0542122	19-05-93	DE-A- 4137001	13-05-93
EP-A-0340382	08-11-89	DE-A- 3814683 AU-B- 613181 AU-B- 3380389 CA-A- 1328628 DE-U- 8805718 ES-T- 2042810 JP-A- 2099188 JP-B- 7022747 PT-B- 90384 SU-A- 1801024 US-A- 4895648	09-11-89 25-07-91 02-11-89 19-04-94 21-07-88 16-12-93 11-04-90 15-03-95 29-04-94 07-03-93 23-01-90